RCCES Seminar series, 26 April 2018, 5:30 pm, room C318

Research and Development in Design of Steel and Composite Structures at the University of Leeds

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Today, it is estimated that more than 35% of steel-framed buildings incorporate long spans in excess of 12m. In the late 1990s, cellular beams replaced castellated beams and gained prominence. Cellular beams are now estimated to have increased from 40% to 92% share of the steel beams in the UK market during the last decade according to the New Steel Construction (NSC) magazine. There is a lot of research on perforated beam webs with the geometry of the perforation ranging from circular, elongated, to non-standard shapes to make beams lighter while stronger and more aesthetically appealing. However, very limited research has been found with regards the design limitations of seismic MRFs when such perforated beams are used. An extensive investigation has been conducted at Leeds University to understand how MRFs with perforated beams respond while a new concept, the so-called RWS connections, has been developed and tested employing different types of connections.

Aerospace and automotive engineers routinely employ topology optimisation and have reported significant structural performance gains; thus Leeds' group has extensively exploited the use of advanced topology optimisation techniques for the development of structural members, such as the development of a new architecture for perforated steel beams. Moreover, novel morphologies of steel and aluminium cross-sections have been pioneered through comprehensive parametric studies improving the cross-sectional stiffness while minimising the weight of such thin-walled beams and columns. Under the same concept, a new breed of prefabricated ultra-thin and ultra-shallow steel-concrete composite flooring systems is undergoing investigations and recently patented, following extensive LCA/LCC studies of the components and the final product assembly.

Dr Konstantinos Daniel TSAVDARIDIS:
Dr Konstantinos (Kostas) Daniel Tsavdaridis is Associate Professor of Structural Engineering in the School of Civil Engineering at the University of Leeds. He is a Fellow of the Institution of Civil Engineers (FICE), a Chartered Civil Engineer in the UK (CEng) and Europe (EUR ING), a Member of the Institution of Structural Engineers (MIStructE) and the European Council of Civil Engineers and an Associate Member of the American Society of Civil Engineers (A.M.ASCE). Kostas acts as the Leader of the 'Materials and Structures' Theme at the School of Civil Engineering and the Director of the 'Steel and Steel-Concrete Composite Structures Laboratory'.

His research expertise is in structural product development that embraces resilience and sustainability; particularly the development of innovative seismic-resistant design of connections, testing large and full-scale specimens and using advanced modelling techniques. He has published more than 100 scientific articles, journal publications, technical reports and international conference papers. Kostas is a core member of the EPSRC Strategic Equipment Grant for establishing a Dynamic Multi-Axial Shaking Table (MAST) testing facility at the University of Leeds (EP/L022648/1, £1.2M) and he holds a portfolio of around £1.5M funded by the Industry and Research Councils. He has also contributed to other multi-million EPSRC projects (e.g., EP/P017169/1). He is an active member of the *fib* (CEB-FIP TG7 and TG10) and the International Association for Shell and Spatial Structures (IASS) while working for standardisation and development of design guidelines and specifications.